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# Rio Blanco
# Oil Shale Project

## FISH AND WILDLIFE MANAGEMENT PLAN

Gulf Oil Corporation

Company (Indiana)
den Avenue, Denver, Colorado 80231

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# FISH AND WILDLIFE
# MANAGEMENT PLAN

Prepared by:

Rio Blanco Oil Shale Project
Tract C-a

For:

Mr. Peter Rutledge
Area Oil Shale Supervisor

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September 1975

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# I. INTRODUCTION

In February 1974, a lease to tract C-a, part of the prototype oil shale program, was issued to Gulf Oil Corporation and Standard Oil Company (Indiana) by the U. S. Department of the Interior. These companies subsequently founded Rio Blanco Oil Shale Project (RBOSP) to operate the tract.

Environmental stipulations were included in the lease document. Section 4 (a) of these stipulations required that the Lessee submit, for approval by the Area Oil Shale Supervisor, a fish & wildlife management plan.

> "The Lessee shall submit for approval by the Mining Supervisor, as part of the exploration and mining plan, a detailed fish and wildlife management plan which shall include the steps which the Lessee shall take to: (1) avoid or, where avoidance is impracticable, minimize damage to fish and wildlife habitat, including water supplies; (2) restore such habitat in the event it is unavoidably destroyed or damaged; (3) provide alternate habitats; and (4) provide controlled access to the public for the enjoyment of the wildlife resources on such lands as may be mutually agreed upon. The plan shall include, but not be limited to, detailed information on activities, time schedule, performance standards, proposed accomplishments, and ways and means of avoiding or minimizing environmental impacts on fish and wildlife."

This document responds to Section 4 (a) of the environmental lease stipulations. The activities discussed and mitigation procedures described by this plan involve only the 2-year exploratory phase of development. A basin-wide fish and wildlife management plan is now being contemplated, and will be directed by the Bureau of Land Management and the Colorado Division of Wildlife.

# II. DESCRIPTION OF LEASE AREA

Tract C-a lies within the Northwestern flank of the Piceance Creek Basin, 8 km (5 miles) east of Cathedral Bluffs and 30 km (18 air miles) southeast of Rangely, Colorado (Figure 1). Elevation on the tract varies from 6700 to 7200 feet. Gulches cross the tract in a northeast orientation. Thick alluvial deposits, up to 42 m deep, fill the valley floors.

The Catherdral Bluffs, rising to 9,000 feet are about 8 km from the tract and mark the western boundary of the basin. The tract is generally bordered on the south by Stake Springs Draw, on the North by Duck Creek and on the east by Wolf Ridge.

The region is semi-arid with annual precipitation of 30 to 38 cm, much of which falls as snow. The entire region is drained by the White River which ultimately empties into the Colorado River. The tract is drained by Box Elder and Corral Gulches. Other nearby drainages are Stake Springs Draw and Duck Creek. Runoff from all these drainages is carried north to the White River by Yellow Creek.

Most of the streams associated with the tract are intermittent and flow only during spring runoff and heavy rains. Diversity of aquatic organisms is limited. No fish are found on tract or in Yellow Creek south of Barcus Creek, but benthos, plankton and periphyton are present when the streams are flowing.

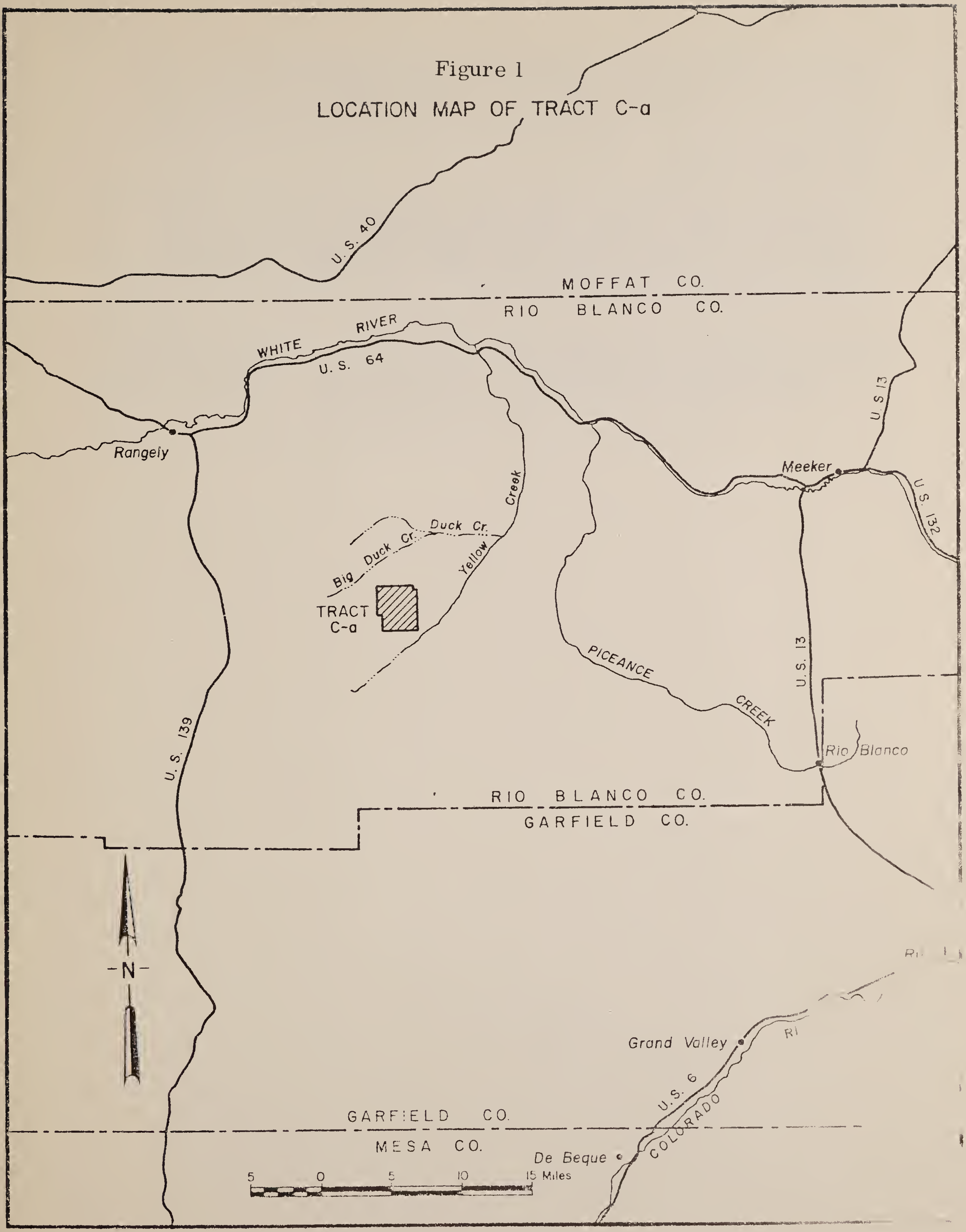
Ten species of fish have been reported from the White River and lower Yellow River during baseline studies (Appendix 1). Diatoms and protozoa appear to be the most common plankton organisms so far collected during early baseline studies. A total of 93 taxa of benthic organisms has been identified.

Nine major vegetation communities have been identified on and adjacent to Tract C-a. They include: aspen, Douglas fir, upland meadow, mixed brush, pinyon-juniper, sagebrush, shadscale, rabbitbrush and riparian. Aspen and Douglas fir occur to the west of the tract on Cathedral Bluffs, along with scattered upland meadows and mixed brush (serviceberry, gambels oak, sagebrush and mountain mahogany).

Several species of small mammals occur in the area and include ground squirrels, chipmunks, deer mice, piñon mice, voles and shrews. Species previously identified in baseline studies are listed in Appendix 1.

Figure 1

LOCATION MAP OF TRACT C-a



Medium-sized mammals found in the area include bobcats, coyotes, weasels and porcupines. The most common large herbivore is the mule deer. Elk are found west of the tract and feral horses range throughout the area. Domestic cattle are common to the area during the warmer months.

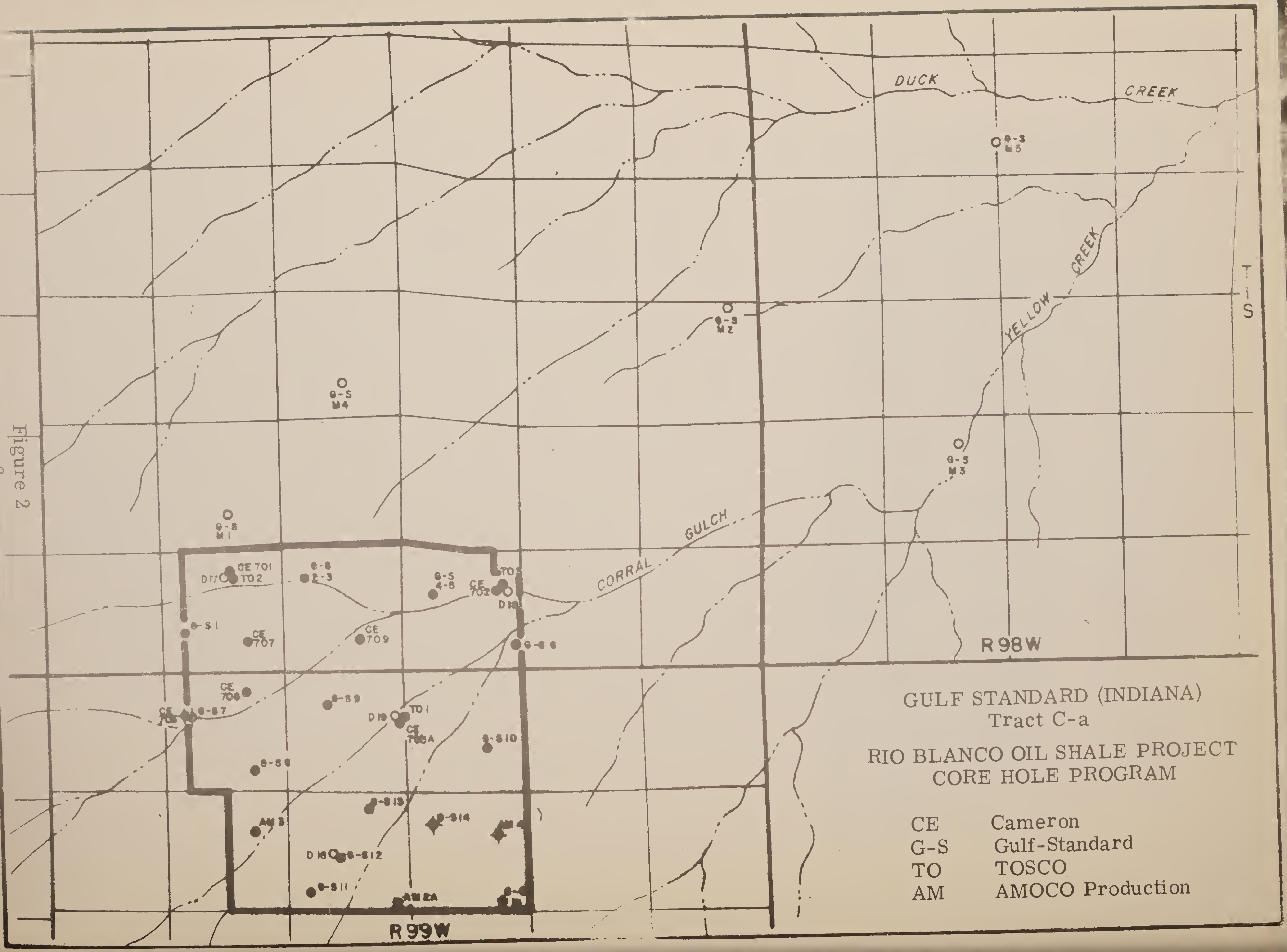
A total of 85 species of birds has been identified during baseline studies. Both the golden eagle and bald eagle winter in Piceance Basin. Other raptors include the rough-legged hawk, marsh hawk, prairie falcon and redtail hawk.

Only a few reptiles and amphibians are known to occur in the area. They include the sagebrush lizard, fence lizard, horned lizard, tiger salamander and the leopard frog.

# III DESCRIPTION OF BASELINE ACTIVITIES

## A. Geologic Studies - Corehole Program

The technical program is a short-term program designed to determine the structure, stratigraphy and extent of the oil shale resource on Tract C-a. The corehole program was initiated on July 3, 1974. Drilling was completed on October 27, 1974. Thirteen coreholes were drilled during this period (Figure 2). Coreholes, drilled by Cameron, TOSCO and AMOCO Production Company prior to award of the lease, are also indicated on Figure 2. The drilling schedule is shown in Table 1. The maximum number of people on site at any given time during this program did not exceed 50. Approximately 13 ha were disturbed during the drilling activities. This represents only .65% of the total tract area. Figure 3 indicates scheduled activity during baseline work.



GULF STANDARD (INDIANA)
Tract C-a

RIO BLANCO OIL SHALE PROJECT
CORE HOLE PROGRAM

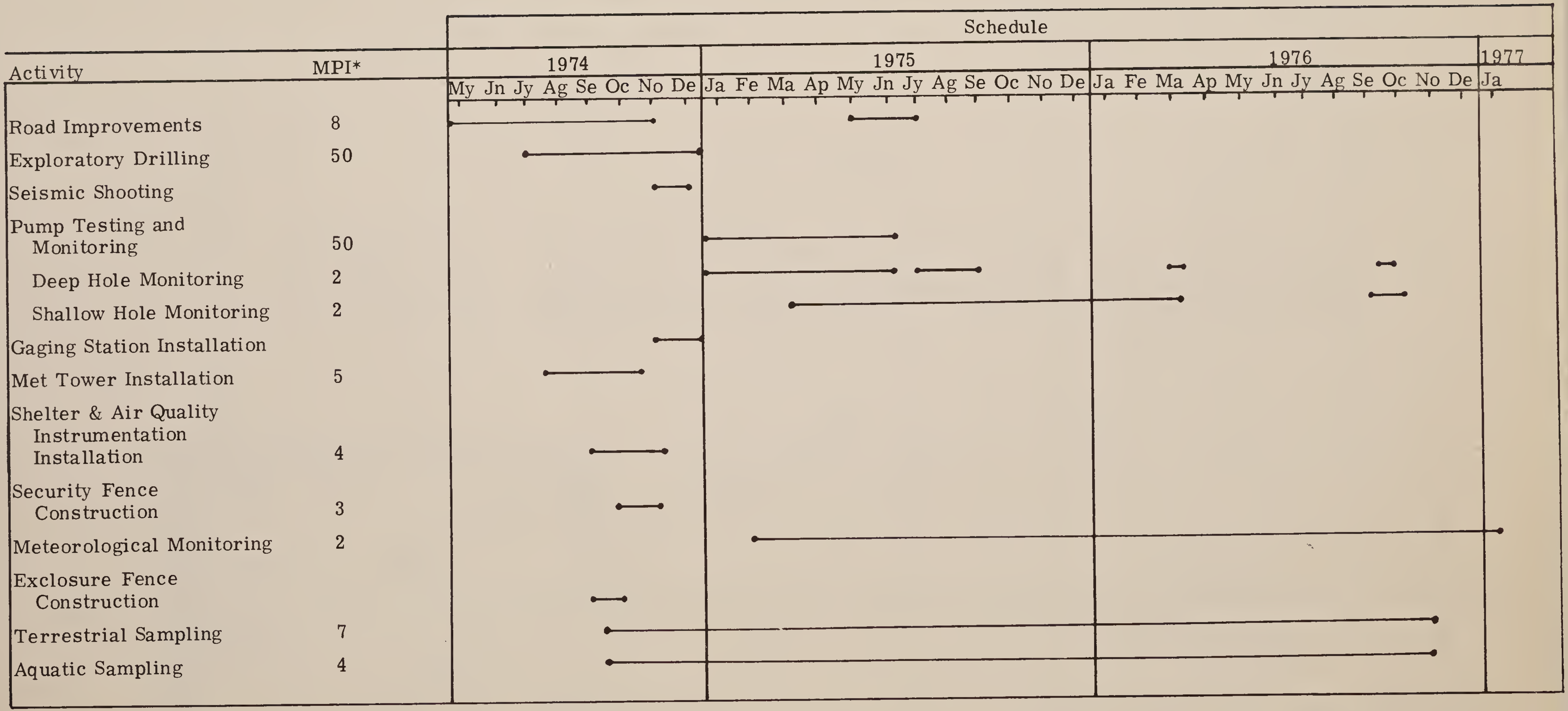
| | |
|---|---|
| CE | Cameron |
| G-S | Gulf-Standard |
| TO | TOSCO |
| AM | AMOCO Production |

Figure 2

Table 1. Drilling Schedule For RBOSP Tract C-a Exploratory Studies

| Hole No. | Date<br>Spudded | Complete |
|---|---|---|
| G-S 1 | 8/13/74 | 8/27/74 |
| G-S 2-3 | 7/27/74 | 8/10/74 |
| G-S 4-5 | 8/11/74 | 9/3/74 |
| G-S 6 | 7/2/74 | 7/26/74 |
| G-S 7 | 7/23/74 | 8/8/74 |
| G-S 8 | 7/4/74 | 7/20/74 |
| G-S 9 | 8/28/74 | 9/13/74 |
| G-S 10 | 9/15/74 | 10/2/74 |
| G-S 11 | 9/30/74 | 10/13/74 |
| G-S 12 | 9/4/74 | 9/17/74 |
| G-S 13 | 9/17/74 | 9/29/74 |
| G-S 14 | 10/4/74 | 10/23/74 |
| G-S 15 | 10/14/74 | 10/30/74 |
| | | |
| G-S D 16 | 11/17/74 | 12/18/74 |
| G-S D 17 | 11/17/74 | 12/18/74 |
| G-S D 18 | 11/9/74 | 12/18/74 |
| G-S D 19 | 11/25/74 | 12/18/74 |
| | | |
| G-S M 1 | 11/6/74 | 12/18/74 |
| G-S M 2 | 10/25/74 | 10/29/74 |
| G-S M 3 | 10/30/74 | 11/8/74 |
| G-S M 4 | 10/31/74 | 11/6/74 |
| G-S M 5 | 6/23/75 | 7/1/75 |

G-S - coreholes, D - large diameter pump testing holes
M - monitoring holes



* Maximum Personnel Involvement

Figure 3. Baseline Activities on Tract C-a, RBOSP

### B. Hydrology Studies - Surface and Sub-surface Water Studies

Hydrology studies are conducted on and near the tract to provide information on surface and sub-surface (aquifer) water quality and quantity. Surface water characteristics will be used by the aquatic contractors in describing aquatic ecosystems. Surface water data are collected at eleven surface gaging stations (Figure 4), which were built and are operated by the U. S. Geological Survey (USGS). Six of the stations were operational by March, 1974. Automatic sediment samplers were installed in August, 1974. Fifteen alluvial monitoring holes have been drilled in the area to determine the status of water in the alluvial strata. Many of these are associated with the surface water gaging stations (Figure 4).

Aquifer tests were conducted in conjunction with the corehole drilling program from July through October 1974. In addition, five monitoring and four large diameter pump testing holes were drilled (Figure 5). The projected schedule for completing aquifer tests is shown in Figure 3. The number of technicians on tract during these studies did not exceed 50.

### C. Environmental Baseline Studies

The environmental baseline program is presently composed of three major facets, air quality and meteorological studies, aquatic studies and terrestrial studies. These studies are designed to determine the baseline conditions of the area in regard to the physical, chemical and biological components of the ecosystem. A more detailed breakdown of the environmental programs appears in Figure 6.

Air quality - meteorology studies required the erection of four instrument shelters and towers. Work on installation of the towers began in early July, 1974. Sites were prepared during August, 1974, and shelters were installed in September. The schedule for the installation and construction of air quality and meteorology equipment is presented in Figure 3.

Aquatic field investigations began in October 1974. Field crews are small, not over 3 or 4 people, and the average number of days per sampling period is approximately 30. The schedule of aquatic activities is shown in Figure 3.

Terrestrial sampling began in October 1974. Sampling crews normally number six to seven people at the maximum. The terrestrial program includes study of one 1.2 ha enclosed vegetation plot. The exclosure was under construction in October 1974. A schedule of terrestrial sampling activities is given in Figure 3.

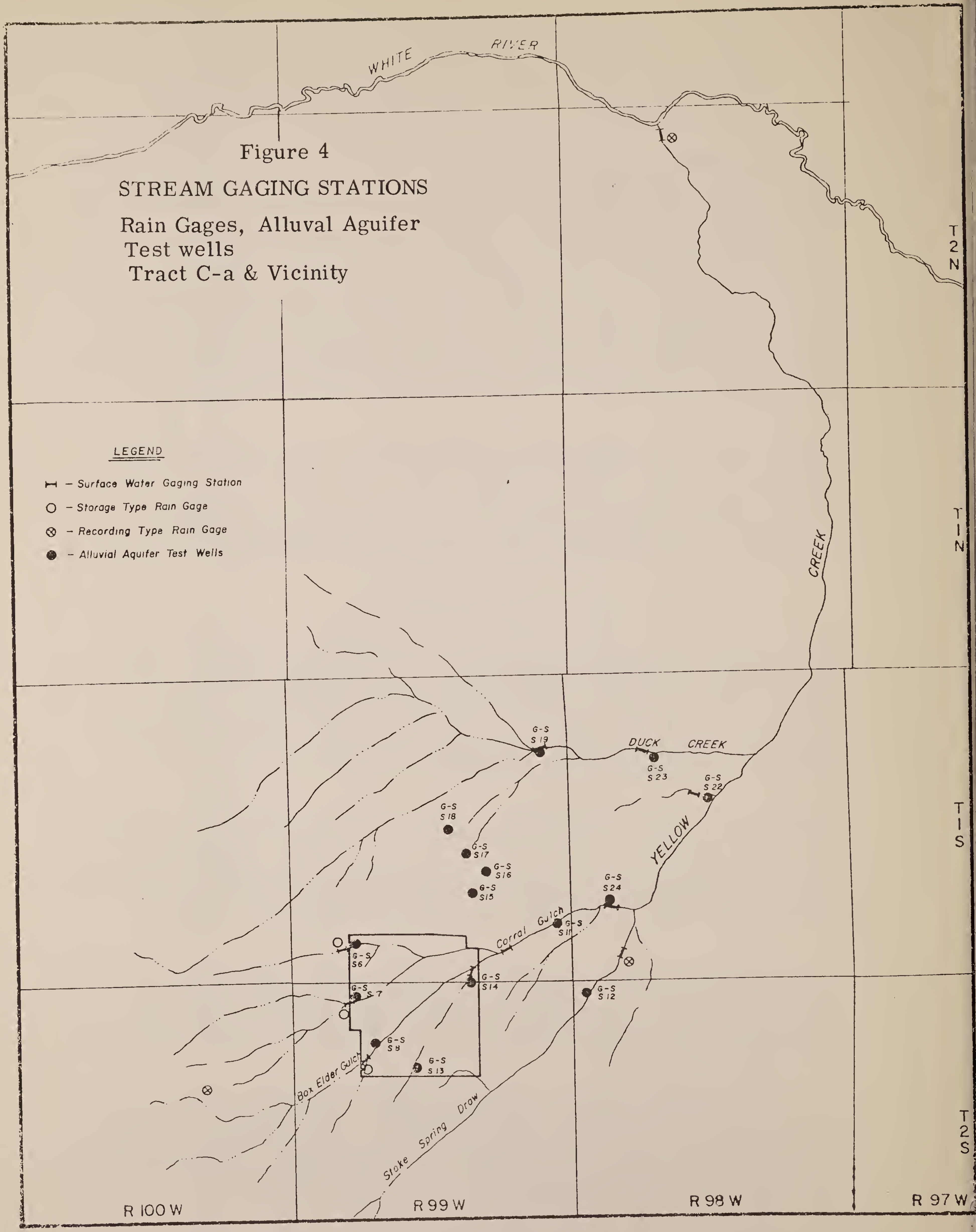
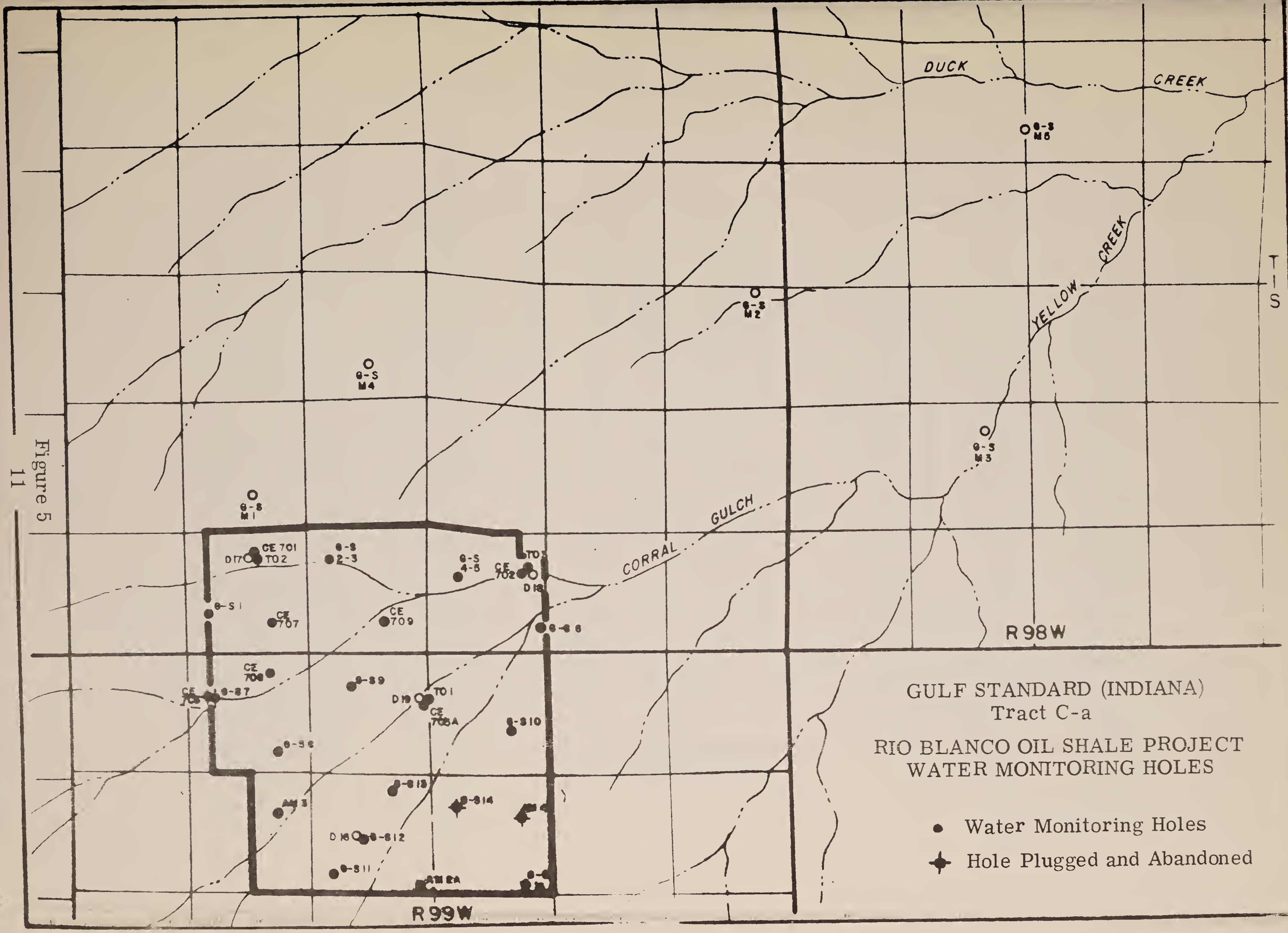


Figure 4

STREAM GAGING STATIONS

Rain Gages, Alluval Aguifer
Test wells
Tract C-a & Vicinity



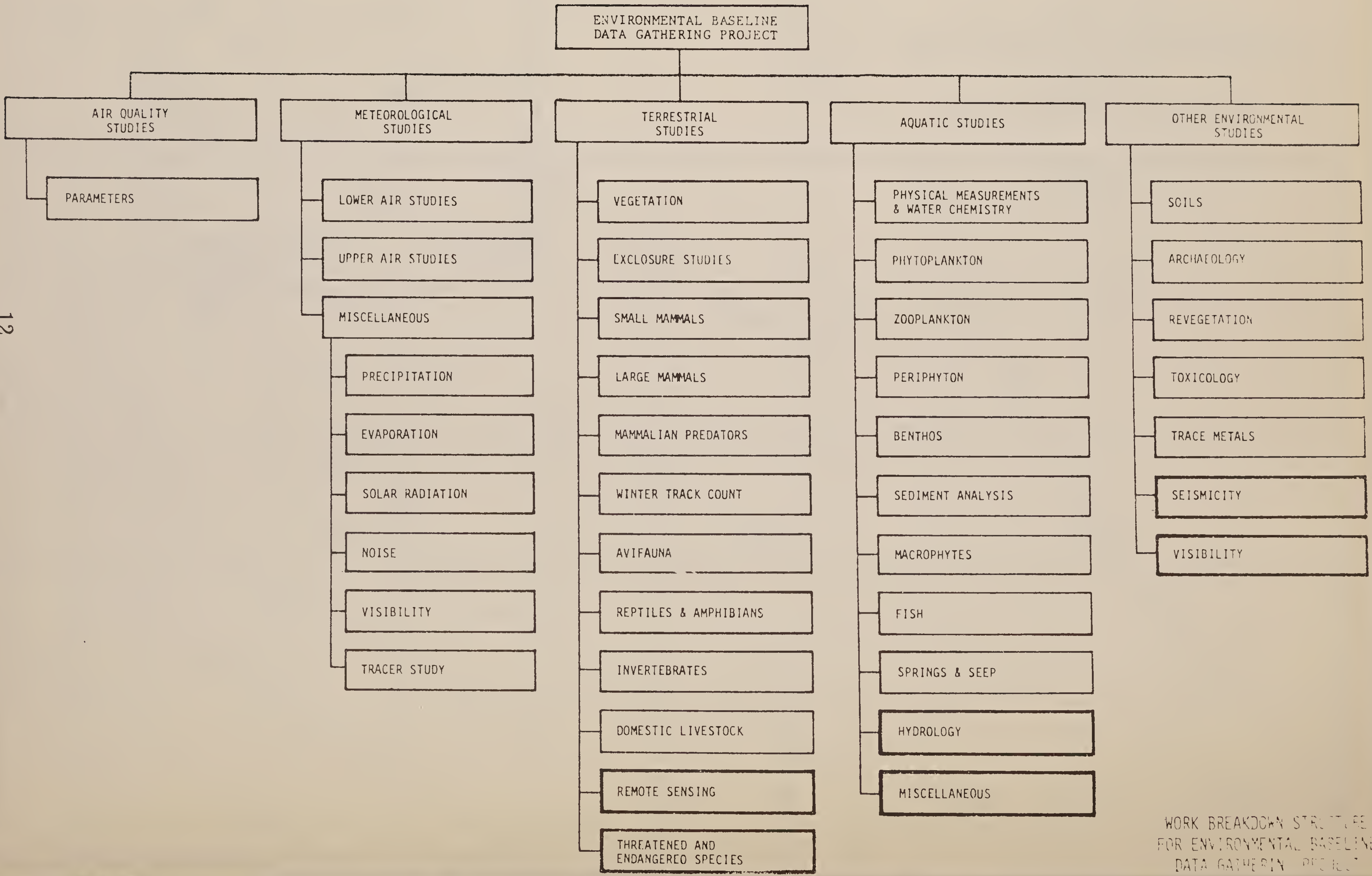
GULF STANDARD (INDIANA)
Tract C-a

RIO BLANCO OIL SHALE PROJECT
WATER MONITORING HOLES

- ● Water Monitoring Holes
- ✦ Hole Plugged and Abandoned

Figure 5

Figure 6



WORK BREAKDOWN STRUCTURE
FOR ENVIRONMENTAL BASELINE
DATA GATHERING PROJECT

## IV. IMPACTS AND MITIGATIONS

The principle considerations of this plan are to 1) delineate and identify possible sources of disturbance to fish and wildlife which may occur on Tract C-a as a result of exploratory activities (baseline studies) and 2) to present plans for mitigating these impacts.

The approach taken is to itemize the types of activities which can produce impacts on fish and wildlife of the area, describe the related perturbations and suggest means of lessening the impact of these disturbances.

The following activities are considered possible sources of impact:

- Road Improvements
- Corehole Drilling
- Pump Testing
- Installation of Water Gaging Stations
- Construction and Maintenance of Support Facilities
- Installation of Meteorological Towers and Instrument Shelters
- Construction of Security and Exclosure Fences
- Biological Sampling
- Human Activity

These activities could result, directly or indirectly, in impacts on limited areas of habitat and the wildlife found here.

### A. Effects on Habitat

Direct effects are habitat loss through denudation of drill pad sites, widening of roads and fencing of study and equipment areas. Indirect effects are the wind and water erosion of denuded drill pad sites and roadways which could potentially increase sediment load in adjacent aquatic habitats and affect air quality. Release of poor quality sub-surface water during pump testing could result in contamination of surface water sources. Increased use of improved roadways could increase fugitive dust load.

Initial mitigation procedures. Steps already taken to minimize these impacts include:

1. Clearing minimum area for drill pad sites,
2. Limiting road construction to improvement of existing roads whenever possible,
3. Limiting size and number of fenced areas to conform with absolute needs,
4. Biologically clearing all development areas prior to disturbance,
5. Placing support facilities on drill pad sites to avoid additional disturbance,
6. Removing trash from the area for disposal,
7. Complying with state and federal regulations in construction of meteorological towers,
8. Controlling water erosion by directing released water into drainage ditches and controlling rate of flow,
9. Controlling release of contaminated sub-surface water, and
10. Surfacing highly traveled roads to reduce dust.

Proposed habitat restoration procedures. Habitat disturbed or destroyed during exploratory activities (i.e. drill pad sites) will be restored for use following cessation of the disturbance. Denuded areas will be planted with a selected mixture of native and introduced plant species. Planting of these areas will begin in Fall 1975. Area disturbed and area to be rehabilitated during drilling, construction of access roads and erection of air studies equipment are presented in Appendix 1.

The seed mixture will contain grasses, shrubs and forbs, selected for their adaptibility to environmental conditions characteristic of Tract C-a. The diverse compliment of plants produced from this mixture will provide forage for wildlife species known to inhabit these areas (Appendix 2). Species selected, reasons for their selection, and recommended quantities of seed per hectare are listed in Table 2.

Table 2 Suggested seed mixture for seeding drill pad sites on RBOSP Tract C-a.

| Common Name (Scientific Name) | Suitability Code[1] | Amount of Seed (kg/ha) | |
|---|---|---|---|
| | | Drilled | Broadcast |
| Pubescent wheatgrass (*Agropyron trichophorum*) | 2, 4, 6, 8, 9 | 2.80 | 5.62 |
| Western wheatgrass (*Agropyron smithii*) | 4, 5, 8, 9 | 2.80 | 5.62 |
| Bluebunch wheatgrass (*Agropyron spicatum*) | 1, 5, 7 | 2.80 | 5.62 |
| Streambank wheatgrass (*Agropyron riparium*) | 3, 5, 8, 9 | 2.80 | 5.62 |
| Sand dropseed (*Sporobolus cryptandrus*) | 2, 4, 5, 7, 9 | 0.56 | 1.12 |
| Indian ricegrass (*Oryzopsis hymenoides*) | 2, 4, 5, 7, 9 | 1.12 | 2.25 |
| American vetch (*Vicia americana*) | 5 | 0.56 | 1.12 |
| Cicer milkvetch (*Astragalus cicer*) | 6, 11 | 0.56 | 1.12 |
| Yellow sweetclover (*Melilotus officinalis*) | 2, 4, 5, 9, 11 | 0.56 | 1.12 |
| Big sagebrush (*Artemisia tridentata*) | 2, 5, 9, 10, 11 | 0.22 | 0.45 |
| Little rabbitbrush (*Chrysothamnus vicidiflorus*) | 2, 4, 5, 9, 11 | 0.22 | 0.45 |
| Bitterbrush (*Purshia tridentata*) | 1, 5, 9, 10, 11 | 1.12 | 2.25 |
| Mountain mahogany (*Cercocarpus montanus*) | 1, 5, 10 | 0.56 | 1.12 |
| Fourwing saltbush (*Atriplex canescens*) | 3, 4, 5, 9 | 1.12 | 2.25 |
| Totals | | 17.80 | 35.73 |

[1] 1 - Highly palatable; 2 - Moderately palatable; 3 - Unpalatable; 4 - Soil stabilizer; 5 - Native species; 6 - Introduced species; 7 - Bunch grass; 8 - Sod grass; 9 - Drought resistent; 10 - Browse; 11 - Cover for game

Denuded areas will be contoured to reduce erosion. The soil will be thoroughly disturbed to a depth of 45 cm. Seed mixtures will be planted by drilling or broadcasting. Information gained from the revegetation literature review and experimental studies to be initiated in the spring of 1975 will help determine which method is more suitable. Seed mixtures will be adjusted as the growing data base indicates.

Disturbed sites will be planted in the fall following cessation of activity. Success of the revegetation effort will be monitored and planting will be repeated if necessary until a suitable vegetation cover is achieved.

### B. Effects on Wildlife

In addition to the loss or disturbance of habitat, wildlife may be adversely affected by noise of heavy machinery and humans at work and the presence of unusual structures or fences could pose a hazard to some wildlife. Terrestrial and aquatic sampling can cause stress to fish and wildlife. Increased human activity (workmen, tourists, naturalists) can affect wildlife through increased road kills, deposition of litter harmful to wildlife if swallowed, inadvertent disturbance to secretive species or by wanton destruction of animals or their young.

Initial mitigation procedures. Noise of heavy machinery is an unavoidable impact. However, work was concluded as rapidly as possible and men and machinery were removed from the area. Security fences were constructed around meteorological towers and instrument shelters to prevent entry by wildlife. Barbed-wire sections of the exclosure fence were topped with a rail to increase visibility and prevent injury to wildlife which might otherwise collide with the wire. Terrestrial sampling programs were designed to limit stress and mortality to wildlife. Live-traps are used for capturing small mammals and animals are released after capture. Snap-trapping is very limited. Nesting material is placed in traps during cold weather to reduce stress, and number of traps set is greatly reduced. Shade is provided for animals taken in traps during warm weather. If weather conditions become unfavorable, trapping is suspended until conditions improve. Animals identified as susceptible to stress from human presence are avoided. The number of fish removed during aquatic sampling is relatively small. Most are sampled by shocking and released. The increased human use of the area cannot be avoided. However, speed limits will be posted to slow traffic and help prevent road kills, and speed bumps will be constructed should they become necessary.

Proposed mitigation procedures. A RBOSP representative will be stationed at the entrance to the tract during the summer when tourist traffic is likely to be most heavy. He will endeavor to explain the types of work going on and to elicit cooperation from visitors in regard to wise use of the area and disturbances to wildlife. In addition, he will police the tract on a regular basis to collect litter left behind and report damages to facilities and habitat in the area.

When plants or animals listed by state or federal agencies as threatened or endangered are encountered on or in the vicinity of Tract C-a during baseline studies, the AOSS will be notified as soon as possible and species' presence will be documented in monthly and quarterly reports. All activities affecting these species will be regulated to comply with federal and state laws and AOSS guidelines regarding threatened and endangered species.

## V. SUMMARY

The mitigation procedures proposed herein are designed to reduce possible impacts of exploratory activities prior to development of the resource. It is not intended to serve as the ultimate management plan. A formal "Fish and Wildlife Management Plan" which will discuss approaches to management of the area as development proceeds and will consider environmental baseline data gathered to date will be presented as a part of the Detailed Development Plan (DDP).

# APPENDIX 1

## Areas Disturbed and Areas To Be Rehabilitated During Baseline Activities

## APPENDIX 1

Table 1-1 Drill pad sites on RBOSP Tract C-a

| Site | Disturbed Area (ha) | Area to be Rehabilitated (ha) | Type of Activity Planned | | |
|---|---|---|---|---|---|
| | | | Seed | Fence | Other |
| G-S 1 | 0.48 | 0.48 | Yes | Yes | Minor Cleanup |
| G-S 2/3 | 0.65 | 0.65 | Yes | Yes | -- |
| G-S 4/5 | 0.53 | 0.53 | Yes | Yes | Minor Cleanup |
| G-S 6 | 0.69 | 0.69 | Yes | Yes | Remove drilling supplies |
| G-S 7 | 0.44 | 0.44 | Yes | Yes | Remove downed sagebrush |
| G-S 8 | 0.65 | 0.65 | Yes | Yes | Minor Cleanup |
| G-S 9 | 0.44 | 0.44 | Yes | No | -- |
| G-S 10 | 0.28 | 0.28 | Yes | No | -- |
| G-S 11 | 0.48 | 0.48 | Yes | Yes | -- |
| G-S 12, G-S D-16 | 0.72 | 0.72 | Yes | Yes | -- |
| G-S13 | 0.40 | 0.40 | Yes | No | -- |
| G-S14 | 0.36 | 0.36 | Yes | Yes | -- |
| G-S15 | 0.44 | 0.0✓ | No | No | Place slash on site as mulch |
| -S M-1 | 0.57 | 0.57 | Yes | No | Place slash on site as mulch |
| -S M-2 | 0.40 | 0.40 | Yes | Yes | -- |
| -S M-3 | 0.24 | 0.24 | Yes | Yes | Minor Cleanup |
| -S M-4 | 0.32 | 0.32 | Yes | Yes | Place slash on site as mulch |
| G-S D-17 | No new disturbance | -- | Re-seed as needed | Yes | Minor Cleanup |
| G-S D-18 | No new disturbance | -- | Re-seed as needed | No | -- |
| G-S D-19 | No new disturbance | -- | Not determined | Yes | Minor Cleanup |

Total Area Disturbed - 8.08 ha
Total Area to be Rehabilitated - 7.64 ha

CH - Coreholes; M - Ground Water Monitoring Holes; D - Large Diameter Test Holes; ✓ - Too Rocky to be Seeded

## APPENDIX 1

Table 1-2. New Access Roads Built During RBOSP Exploratory Activities, Tract C-a.

| Site Served by Access Road | Length (m) | Width (m) | Total Area Disturbed (ha) | Total Area to be Rehabilitated (ha)[1] |
|---|---|---|---|---|
| G-S 1 | 547.2 | 7.3 | 0.40 | 0.0 |
| G-S 10 | 1064.0 | 7.3 | 0.78 | 0.0 |
| G-S 11 | 486.4 | 7.3 | 0.35 | 0.0 |
| G-S 12 | 638.4 | 7.3 | 0.47 | 0.0 |
| G-S 13 | 760.0 | 7.3 | 0.55 | 0.0 |
| G-S 14 | 790.4 | 7.3 | 0.58 | 0.58 |
| G-S 15 | 1094.4 | 7.3 | 0.80 | 0.0 |

[1] Most roads will be left open for public use

Table 1-3 . Air Studies Sites, RBOSP Tract C-a

| Site | Disturbed Area (ha) | Area to be Rehabilitated (ha) |
|---|---|---|
| 1 | .43 | .43 |
| 2 | .01 | .01 |
| 3 | .01 | .01 |
| 4 | .01 | .01 |

# APPENDIX 2

## Plant and Animal Species Known to Occur on Tract C-a RBOSP.

# APPENDIX 2
## Table 2-1

Tree, shrub, and herbaceous vegetation species encountered to date[1] in the vicinity of Tract C-a for the Rio Blanco Oil Shale Project.

| Scientific Name | Common Name |
|---|---|
| **TREES** | |
| *Juniperus osteosperma* (utahensis) | Utah juniper |
| *Pinus edulis* | Pinyon pine |
| *Populus tremuloides* | Quaking aspen |
| *Pseudotsuga menziesii taxifolia* | Common Douglas fir |
| **SHRUBS** | |
| *Acer glabrum* | Rocky Mountain maple |
| *Amelanchier* sp. | Serviceberry |
| *Artemisia frigida* | Fringed sagewort |
| *Artemisia tridentata* | Basin big sagebrush |
| *Atriplex canescens* | Fourwing saltbush |
| *Atriplex confertifolia* | Shadscale saltbush |
| *Cercocarpus montanus* | True mountain mahogany |
| *Chrysothamnus nauseosus* | Rubber rabbitbrush |
| *Chrysothamnus viscidiflorus* | Douglas rabbitbrush |
| *Ephedra* sp. | Mormontea |
| *Eurotia lanata* | Common winterfat |
| *Prunus* sp. | Chokecherry |
| *Purshia tridentata* | Antelope bitterbrush |
| *Quercus gambelii* | Gambel oak |
| *Rhus* sp. | Sumac |
| *Ribes* sp. | Currant |
| *Rosa* sp. | Rose |
| *Sarcobatus vermiculatus* | Black greasewood |
| *Symphoricarpos oreophilus* | Snowberry |
| *Tetradymia canescens* | Gray horsebrush |
| **HERBACEOUS SPECIES** | |
| *Achillea lanulosa* | Western yarrow |
| *Agropyron cristatum* | Crested wheatgrass |
| *Agropyron smithii* | Western wheatgrass |

(Continued)

| Scientific Name | Common Name |
|---|---|
| Agropyron spicatum | Bluebunch wheatgrass |
| Agropyron trachycaulum | Slender wheatgrass |
| Ambrosia sp. | Ragweed |
| Androsace sp. | Rockjasmine |
| Angelica sp. | Angelica |
| Antennaria sp. | Pussytoes |
| Haplopappus sp. | Goldenweed |
| Haplopappus spinulosus | Ironplant goldenweed |
| Arenaria sp. | Sandwort |
| Aster sp. | Aster |
| Astragalus sp. | Milkvetch |
| Balsamorhiza sagittata | Balsamroot |
| Bouteloua gracilis | Blue grama |
| Bromus ciliatus | Fringed brome |
| Bromus marginatus | Mountain brome |
| Bromus tectorum | Cheatgrass brome |
| Carex sp. | Sedge |
| Chaenactis sp. | Dustymaiden |
| Chenopodium sp. | Goosefoot |
| Cryptantha sp. | Cryptantha |
| Cyperus sp. | Flatsedge |
| Descurainia sp. | Transymustard |
| Draba sp. | Draba |
| Elymus sp. | Wildrye |
| Equisetum sp. | Horsetail |
| Erigeron sp. | Fleabane |
| Eriogonum sp. | Wildbuckwheat |
| Eriogonum alatum | Wing wildbuckwheat |
| Euphorbia sp. | Spruge |
| Festuca sp. | Fescue |
| Fragaria sp. | Strawberry |
| Galium boreale | Northern bedstraw |
| Geranium sp. | Geranium |
| Gilia sp. | Gilia |
| Hymenexys sp. | Actinea |
| Kochia scoparia | Fireweed summercypress |

(Continued)

| Scientific Name | Common Name |
|---|---|
| *Koeleria cristata* | Prairie junegrass |
| *Lappula* sp. | Stickseed |
| *Lepidium* sp. | Pepper weed |
| *Lithospermum* sp. | Gromwell |
| *Lupinus* sp. | Lupine |
| *Mentzelia* sp. | Mentzelia |
| *Mertensia* sp. | Bluebells |
| *Muhlenbergia* sp. | Muhly |
| *Oenothera* sp. | Evening primrose |
| *Opuntia polyacantha* | Plains pricklypear |
| *Oryzopsis hymenoides* | Indian ricegrass |
| *Oxytropis lamberti* | Lambert loco |
| *Penstemon caespitosus* | Mat penstemon |
| *Penstemon strictus* | Rocky Mountain penstemon |
| *Phlox* sp. | Phlox |
| *Poa interior* | Inland bluegrass |
| *Poa pratensis* | Kentucky bluegrass |
| *Poa secunda* | Sandberg bluegrass |
| *Ranunculus* sp. | Buttercup |
| *Rorippa* sp. | Cress |
| *Scirpus* sp. | Bulrush |
| *Sitanion hystrix* | Bottlebrush squirreltail |
| *Sphaeralcea* sp. | Globemallow |
| *Stipa* sp. | Needlegrass |
| *Stipa comata* | Needleandthread |
| *Thalictrum* sp. | Meadowrue |
| *Thermopsis montana* | Mountain thermopsis |
| *Viola* sp. | Violet |

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1/The following authorities are used for vegetation nomenclature:

Harrington, H.D. 1954. Manual of the plants of Colorado. The Swallow Press, Inc., Chicago. 666 p.

Hitchcock, A.S. 1971. Manual of the grasses of the United States, 2nd ed., Dover Publ., Inc., New York. 1051 p.

Bettle, A. A. 1970. Recommended plant names. Research Journal 31, Agric. Exp. Sta., Univ. Wyo. Laramie. 124 p.

Table 2-2

Species of birds observed during field investigations to date in the vicinity of Tract C-a for the Rio Blanco Oil Shale Project [1]

| ORDER<br>FAMILY<br>Species | Common Name |
|---|---|
| CICONIIFORMES | |
| ARDEIDAE | |
| *Ardea herodia*[2] | Great blue heron |
| CICONIIDAE | |
| *Plegadis chihi*[2] | White-faced ibis |
| ANSERIFORMES | |
| ANATIDAE | |
| *Anas platyrhynchos*[2] | Mallard |
| *Anas crecca*[2] | Green-winged teal |
| *Anas discors*[2] | Blue-winged teal |
| FALCONIFORMES | |
| ACCIPITRIDAE | |
| *Accipiter cooperii*[2] | Cooper's hawk |
| *Buteo jamaicensis*[2] | Red-tailed hawk |
| *Buteo lagopus* | Rough-legged hawk |
| *Aquila chrysaetos*[2] | Golden eagle |
| *Haliaeetus leucocephalus* | Bald eagle |
| *Circus cyaneus*[2] | Marsh hawk |
| FALCONIDAE | |
| *Falco mexicanus* | Prairie falcon |
| *Falco peregrinus*[2] | Peregrine falcon |
| *Falco sparverius*[2] | American kestrel |

(Continued)

| ORDER<br>FAMILY<br>Species | Common Name |
|---|---|
| GALLIFORMES | |
| TETRAONIDAE | |
| *Dendragapus obscurus* | Blue grouse |
| *Centrocercus urophasianus*[2] | Sage grouse |
| GRUIFORMES | |
| GRUIDAE | |
| *Grus canadensis tabida*[2] | Greater sandhill crane |
| CHARADRIIFORMES | |
| CHARADRIIDAE | |
| *Charadrius vociferus*[2] | Killdeer |
| SCOLOPACIDAE | |
| *Capella gallinago*[2] | Common snipe |
| *Actitis macularia*[2] | Spotted sandpiper |
| *Tringa flavipes*[2] | Lesser yellowlegs |
| PHALAROPODIDAE | |
| *Steganopus tricolor*[2] | Wilson's phalarope |
| COLUMBIFORMES | |
| COLUMBIDAE | |
| *Zenaida macroura*[2] | Mourning dove |
| STRIGIFORMES | |
| STRIGIDAE | |
| *Otus asio* | Screech owl |
| *Bubo virginianus*[2] | Great horned owl |
| *Glaucidium gnoma* | Pygmy owl |
| *Asio flammeus* | Short-eared owl |

(Continued)

| ORDER<br>FAMILY<br>Species | Common Name |
|---|---|
| PICIFORMES | |
| PICIDAE | |
| *Colaptes auratus cafer*[2] | Common (red-shafted) flicker |
| *Dendrocopos pubescens*[2] | Downy woodpecker |
| PASSERIFORMES | |
| TYRANNIDAE | |
| *Sayornis saya*[2] | Say's phoebe |
| *Contopus sordidulus*[2] | Western wood pewee |
| ALAUDIDAE | |
| *Eremophila alpestris*[2] | Horned lark |
| HIRUNDINIDAE | |
| *Iridoprocne bicolor*[2] | Tree swallow |
| *Stelgidopteryx ruficollis*[2] | Rough-winged swallow |
| *Hirundo rustica*[2] | Barn swallow |
| CORVIDAE | |
| *Cyanocitta stelleri*[2] | Steller's jay |
| *Aphelocoma coerulescens*[2] | Scrub jay |
| *Gymnorhinus cyanocephalus*[2] | Pinyon jay |
| *Pica pica*[2] | Black-billed magpie |
| *Corvus corax*[2] | Common raven |
| *Nucifraga columbiana*[2] | Clark's nutcracker |
| PARIDAE | |
| *Parus atricapillus*[2] | Black-capped chickadee |
| *Parus gambeli*[2] | Mountain checkadee |
| *Parus inornatus* | Plain titmouse |
| *Psaltriparus minimus* | Common bushtit |

(Continued)

| ORDER<br>FAMILY<br>Species | Common Name |
|---|---|
| PASSERIFORMES (Continued) | |
| SITTIDAE | |
| *Sitta carolinensis*[2] | White-breasted nuthatch |
| *Sitta canadensis*[2] | Red-breasted nuthatch |
| *Sitta pygmaea* | Pygmy nuthatch |
| CERTHIIDAE | |
| *Certhia familiaris* | Brown creeper |
| MIMIDAE | |
| *Oreoscoptes montanus*[2] | Sage thrasher |
| TURDIDAE | |
| *Turdus migratorius*[2] | American robin |
| *Sialia currucoides*[2] | Mountain bluebird |
| *Myadestes townsendii* | Townsend's solitaire |
| SYLVIIDAE | |
| *Polioptila caerulea*[2] | Blue-gray gnatcatcher |
| *Regulus calendula* | Ruby-crowned kinglet |
| MOTACILLIDAE | |
| *Anthus spinoletta*[2] | Water pipit |
| BOMBYCILLIDAE | |
| *Bombycilla cedrorum* | Cedar waxwing |
| LANIIDAE | |
| *Lanius excubitor* | Northern shrike |
| *Lanius lupovicianus* | Loggerhead shrike |
| STURNIDAE | |
| *Sturnus vulgaris*[2] | Starling |

(Continued)

| ORDER<br>FAMILY<br>Species | Common Name |
|---|---|
| PASSERIFORMES (Continued) | |
| PARULIDAE | |
| *Dendroica coronata*[2] | Yellow-rumped warbler |
| *Vermivora celata*[2] | Orange crowned warbler |
| *Vermivora virginiae*[2] | Virginia's warbler |
| PLOCEIDAE | |
| *Passer domesticus* | House sparrow |
| ICTERIDAE | |
| *Sturnella neglecta*[2] | Western meadowlark |
| *Euphagus cyanocephalus* | Brewer's blackbird |
| *Agelaius phoeniceus*[2] | Red-winged blackbird |
| FRINGILLIDAE | |
| *Carpodacus mexicanus* | House finch |
| *Leucosticte atrata* | Black rosy finch |
| *Leucosticte australis* | Brown-capped rosy finch |
| *Spinus pinus*[2] | Pine siskin |
| *Chlorura chlorura*[2] | Green-tailed towhee |
| FRINGILLIDAE | |
| *Pipilo erythrophthalmus*[2] | Rufous-sided towhee |
| *Pooecetes gramineus*[2] | Vesper sparrow |
| *Amphispiza belli* | Sage sparrow |
| *Junco hyemalis hyemalis*[2] | Dark-eyed junco |
| *Junco caniceps*[2] | Gray-headed junco |
| *Spizella arborea*[2] | Tree sparrow |
| *Spizella passerina*[2] | Chipping sparrow |
| *Spizella breweri*[2] | Brewer's sparrow |

(Continued)

| ORDER<br>FAMILY<br>Species | Common Name |
|---|---|
| PASSERIFORMES (Continued) | |
| FRINGILLIDAE (Continued) | |
| *Zonotrichia leucophrys*[2] | White-crowned sparrow |
| *Passerella iliaca* | Fox sparrow |
| *Rhynchophanes mccownii* | McCown's longspur |
| *Calcarius ornatus* | Chestnut-collared longspur |
| *Plectrophenax nivalis* | Snow bunting |

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1/ The following authorities are used for bird nomenclature:

American Ornithologists' Union. 1957. Checklist of North American Birds, 5th ed. Port City Press, Baltimore, Md. 691p.

American Ornithologists' Union. 1973. Thirty-second supplement to the American Ornithologists' Union checklist of North American Birds (5th ed., 1957). Auk 90:411-419.

2/ Species encountered during the April field period

## APPENDIX 2
## Table 2-3

Species of mammals encountered to date in the vicinity of Tract C-a for Rio Blanco Oil Shale Project[1]

| FAMILY<br>Species | Common Name |
|---|---|
| SORICIDAE (Shrews) | |
| *Sorex cinereus* | Masked shrew |
| *Sorex merriami* (not previously recorded in the area) | Merriam's shrew |
| LEPCRIDAE (Hares and rabbits) | |
| *Lepus californicus* | Black-tailed jackrabbit |
| *Lepus townsendii* | White-tailed jackrabbit |
| *Sylvilagus* sp. | Cottontail |
| SCUIRIDAE (Squirrels, ground squirrels, chipmunks) | |
| *Spermophilus lateralis* | Golden-mantled ground squirre |
| *Spermophilus tridecemlineatus* | |
| *Eutamias minimus* | Least chipmunk |
| *Eutamias quadrivittatus* | Colorado chipmunk |
| *Tamiasciurus hudsonicus* | Red Squirrel |
| GEOMYIDAE (Pocket gophers) | |
| *Thomomys talpoides* | Northern pocket gopher |
| CRICETIDAE (new world mice and rats) | |
| *Peromyscus maniculatus* | Deer mouse |
| *Peromyscus truei* | Pinyon mouse |
| *Neotoma cinerea* | Bush-tailed woodrat |
| *Clethrionomys gapperi* | Gapper's red-backed vole |
| *Microtus montanus* | Mountain vole |
| *Microtus longicaudus* | Long-tailed vole |
| *Lagurus curtatus* | Sagebrush vole |
| *Perognathus apache* | Apache pocket mouse |
| CANIDAE (Coyote, wolves and foxes) | |
| *Canis latrans* | Coyote |

(Continued)

| FAMILY<br>Species | Common Name |
|---|---|
| MUSTELIDAE (Mustelids, weasels, skunks) | |
| Mustela frenata | Longtailed weasel |
| Mustela erminia | Short-tailed weasel |
| FELIDAE (Cats) | |
| Lynx rufus | Bobcat |
| CERVIDAE (Deer and elk) | |
| Cervus canadensis | Elk |
| Odocoileus hemionus | Mule deer |
| EQUIDAE (Horses) | |
| Equus coballus | Feral horse |

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[1/] The following authority is used for small mammal nomenclature:

Hall, E.K. and K.R. Kelson. 1959. The mammals of North America. Ronald Press Co., New York. 1162 p.

## APPENDIX 2
### Table 2-4

### List of Fish Species Collected To Date From Aquatic Sampling Stations, RBOSP Tract C-a

| Common Name | Scientific Name | Number Captured |
|---|---|---|
| Rainbow trout | Salmo gairdneri | 1 |
| Brown trout | Salmo trutta | 1 |
| Mountain whitefish | Prosopium williamsoni | 7 |
| Fathead minnow | Pimephales promelas | 90 |
| Longnose dace | Rhinichthys cataractae | 4 |
| Speckled dace | Rhinichthys osculus | 122 |
| Bluehead sucker | Catostomus discobolus | 26 |
| Flannelmouth sucker | Catostomus latipinnis | 58 |
| Mottled sculpin | Cottus bairdi | 233 |
| Roundtail chub | Gila robusta | 1 |
| Bluehead sucker - Flannelmouth sucker (hybrid) | Catostomus discobolus X Catostomus latipinnis | 1 |

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Conservation Division
Area Oil Shale Supervisor's Office
Mesa Federal Savings & Loan Bldg.
131 N. 6th - Suite 300
Grand Junction, Colorado 81501

October 21, 1975

Re: Acceptance - Wildlife
Management Plan

Mr. Walter T. Herget, President
Rio Blanco Oil Shale Project
9725 E. Hampden Ave.
Denver, Colorado 80231

Dear Mr. Herget:

Your Fish and Wildlife Plan submitted September 18, 1975 has been reviewed by the Colorado Department of Wildlife, BLM, and members of my staff. The plans and procedures for mitigating and damage to wildlife and wildlife habitat are consistent with the terms of the lease. The plan is hereby accepted. A copy of the plan will be given to the Oil Shale Environmental Advisory Panel.

Sincerely,

Original Sgd. Peter A. Rutledge

Peter A. Rutledge

cc: C-a distribution list
H. Ash, OSEAP✓
ELDERKIN/mg

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